

BIBLIOGRAPHY OF MODEL AND PILOT-PLANT APPLICATIONS IN FERROUS METALLURGY, 1945-56

By W. O. Philbrook

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INTRODUCTION

Reduced-scale models have long been used in hydrodynamics, aerodynamics, and heat transfer for studying fundamental flow relations or the performance of prototype designs under prescribed conditions. The pilot plant is a common tool of chemical engineering for investigating process variables and as an integral step in developing a new process. The metallurgical industry was rather slow to recognize the applicability of these techniques to some of its established and rather complex processes, but there has been a rapidly increasing number of applications of the principles of modeling in process metallurgy since World War II. Not only have pilot-scale operations been employed for developing methods of extracting metals that have recently achieved commercial importance, as well as new processes for some of the commoner metals, but models have also been used for engineering studies aimed at better understanding of the controlling variables of time-honored conventional processes. It appears that the principles of similitude have become accepted as a useful tool, when properly applied, in metallurgy as in other fields of engineering.

Much of the work of the Pyrometallurgical Laboratory, Region V, involves study of high-temperature smelting and refining processes for ferrous and related metals in pilot-scale equipment, such as the experimental blast furnace, converter, open-hearth, arc furnace, and rotary kiln. It was appropriate for the work of this laboratory that guiding principles for designing apparatus and interpreting results should be set down and that a bibliography of related work should be available for reference. A summary of the principles of model study and a brief review of some of the more noteworthy general papers have been published elsewhere.^{3/} Also, the Bureau of Mines plans to publish a report of investigations describing its experimental work in this field. The bibliography is presented here as a service to others who may have use for it.

The references cited are primarily papers that were indexed during the 12 years 1945-56, inclusive, by 1 American and 1 British metallurgical abstracting journal, although a few selected older publications have been included. It is entirely

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^{3/} Philbrook, W. O., Fundamentals of Scale-Model Experiments: Jour. Metals, vol. 9, No. 10, October 1957, pp. 1353-1358.

possible that some worthy papers were missed because of poor indexing under subject headings, such as models and pilot plants, especially during the earlier part of the period covered. Too much time would have been required to search under every conceivable process classification. In addition, it was not intended to compile a complete listing on related topics, such as combustion and flame-radiation research, or to follow through certain continuing programs, such as the International Low-Shaft Blast Furnace. In spite of these limitations, the bibliography is believed to be complete enough to be valuable to those working in the area of pyrometallurgical smelting and refining processes. The listing has been subdivided into sections for general references and specific process categories and arranged alphabetically within each section.

SELECTED ABBREVIATIONS

Akad. Verlag, Berlin	Akademische Verlag, Berlin
Akad. Verlagsgesell., Leipzig	Akademische Verlagsgesellschaft m.b.h. Verlagsbericht, Leipzig
Arch. Eisenhüttenw.	Archiv für das Eisenhüttenwesen
Blast Furnace Steel Plant	Blast Furnace and Steel Plant
Bureau of Mines Rept. of Investigations	Bureau of Mines Report of Investigations
Centenary Cong. soc. ind. min.	Centenary Congress, Société de l'Industrie Minérale
Chaleur et ind.	Chaleur et industrie
Chem. Ind.	Chemical Industries
Chem. Week	Chemical Week
Coke and Gas	Coke and Gas
Dimensional Analysis	Dimensional Analysis
Dimensional Analysis and Theory of Models	Dimensional Analysis and Theory of Models
Dimensional Equations, Units, and Dimensions	Dimensional Equations, Units, and Dimensions
Forsch. Gebiete Ingenieurw.	Forschung auf dem Gebiete des Ingenieurwesens
Giesserei	Giesserei
Ind. Eng. Chem.	Industrial and Engineering Chemistry
Inst. Gas Eng. Comm.	Institute of Gas Engineers, Communication and Reports
Iron and Coal Trades Rev.	Iron and Coal Trades Review
Iron and Steel	Iron and Steel
Iron and Steel Eng.	Iron and Steel Engineer
Izvest. Akad. Nauk S.S.S.R., Otdel. Tek. Nauk.	Izvestiya Akademii Nauk S.S.S.R., Otdelenie Tekhnicheskikh
Jour. Am. Ceram. Soc.	Journal, American Ceramic Society
Jour. Electrochem. Soc.	Journal of Electrochemical Society
Jour. Iron and Steel Inst.	Journal, Iron and Steel Institute
Jour. Metals	Journal of Metals
Jour. Sheffield Univ. Fuel Soc.	Journal of Sheffield University Fuel Society
Nature (London)	Nature (London)
Open Hearth Proc.	Open Hearth Proceedings
Phys. Similarity and Dimensional Analysis: An Elementary Treatise	Physical Similarity and Dimensional Analysis: An Elementary Treatise
Pilot Plants, Models and Scale-up Methods in Chem. Eng.	Pilot Plants, Models, and Scale-up Methods in Chemical Engineering
Proc. Blast-Furnace, Coke-Ovens Raw-Materials Comm.	Proceedings, Blast-Furnace, Coke-Ovens, and Raw-Materials Committee

Proc. 1st World Met. Cong.

Proc. Inst. Mech. Eng.

Proc. 7th Internat. Cong. Applied
Mech.

Proc. Soc. Exper. Stress Analysis

Radex Rundschau

Research

Rev. mét.

Rev. univ. mines

Scale Models in Hydraulic Eng.

Soc. Chem. Ind.

Stahl u. Eisen

Tek. Tid.

Tetsu-to-Hogane

Trans. AIME

Trans. Inst. Chem. Eng. (London)

Twenty-first Internat. Foundry Cong.

Waseda Univ. Rept. Casting Res. Lab.

Ztschr. Ver. Deut. Ing.

Proceedings, 1st World Metallurgical
Congress

Proceedings, Institution of Mechanical
Engineers

Proceedings, 7th International Congress for
Applied Mechanics

Proceedings, Society of Experimental Stress
Analysis

Radex Rundschau

Research (London)

Revue de métallurgie

Revue universelle des mines

Scale Models in Hydraulic Engineering

Society of the Chemical Industry

Stahl und Eisen

Teknisk Tidskrift

Tetsu-to-Hogane

Transactions of the American Institute of
Mining, Metallurgical and Petroleum
Engineers

Transactions, Institution of Chemical
Engineers (London)

Twenty-first International Foundry Congress

Waseda University Reports of the Casting
Research Laboratory

Zeitschrift des Vereins deutscher Ingenieure

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